



NASA SBIR 2010 Phase I Solicitation

X1.02 Gas, Liquid, and Solid Processing to Produce Oxygen and Fuels from In-Situ Resources

Lead Center: JSC

Participating Center(s): ARC, GRC, KSC

Solid/Gas Processing to Support Oxygen and Fuel Production

- Gas Separators for lunar oxygen extraction from regolith that provide low pressure drop separation of the system and product gas streams from impurities (e.g. HCl, HF, H₂S, SO₂); the process should be regenerable and the output contaminant concentration should be less than 50 ppb
- Hydrogen gas pumps with rates (up to 6 scfm) for recirculation and pneumatic transport
- Carbon dioxide collection and separation from Mars atmosphere
- High efficiency carbon dioxide/carbon monoxide separation concepts with high quality carbon dioxide produced
- Long-life carbon dioxide electrolysis/dissociation into carbon monoxide and oxygen concepts with high conversion efficiency at pressures greater than or equal to 1 bar

Water Processing

- Water/gas separators that use the space environment for water condensation/separation with minimal energy usage; concepts that can operate in both low-gravity (1/6-g and 3/8-g) and micro-gravity are of greatest interest
- Removal of dissolved ions in water by methods other than de-ionization resins to meet water electrolysis purity requirements (minimum resistivity of 1M-Ohms-cm). Ions of interest are dissolved metal ions (Fe, Cr, Co, Ni, Zn) at concentration of 0.01% and dissolved anions (Cl, F, S) at concentrations of 0.01%-2%. The process should be regenerable, minimize consumables, and minimize water loss.
- Contaminate resistant, high temperature water electrolysis concepts

Trash/Waste Processing for Fuel Production

- Processing concepts for production of carbon monoxide, carbon dioxide, water, and methane from plastic

trash and dried crew solid waste. Proposals must define use of solar or electrical energy during processing, and any reagents/consumables; recycling schemes for reactants/reagents used in the processing should be evaluated

- Methods for waste/trash transfer and handling before and after processing